S7-1RS485 Multi-Function Transmitter

(485 Type)

USER GUIDE

SINTEK

Chapter 1: Product Introduction

1.1 Product Overview

S7-1RS485 is a 5-in-1 transmitter that combines temperature and humidity sensors, PM2.5/10 sensors, CO sensors, and CO2 sensors. It uses high-precision sensors as core detection devices. The transmitter features a wide measurement range, high accuracy, good linearity, versatility, easy operation, convenient installation, long transmission distance, and moderate price. The PM2.5 sensor utilizes a pump-type probe, where air is pumped into the sensor by a fan, providing better response speed and higher accuracy compared to conventional diffusion sensors.

1.2 Product Features

This product adopts a high-sensitivity gas detection probe, ensuring stable signals and high accuracy. It has a wide measurement range, good linearity, and easy usability.

1.3 Product Appearance and Dimensions

1.4 Main Parameters

DC Power Supply (Default)	9 ~36 V DC
Power Consumption	≤1.5W(12V DC, 25℃)
Average Current	＜150mA
Transmitter Circuit Operating Temperature and Humidity	-10℃ ~ +60℃, 0% RH ~ 85% RH (non-condensing)
PM2.5/10 Measurement Range	0-1000ug/m3
PM2.5/10 Measurement Accuracy	<100 ug/m3 ±ug/m3 >100 ug/m3 ±10%.FS
Stability	＜2%F・S
Non-linearity	＜1%F・S
Response Time	≤120S
Warm-up Time	2 minutes (usable), 10 minutes (maximum accuracy)
Operating Pressure Range	0.9 - 1.1 atm
Temperature Measurement Range	-40 - 80℃
Temperature Accuracy	0.5℃ (typical value at 25℃)
Humidity Measurement Range	0-99.9%RH
Humidity Accuracy	±3%RH (25℃)
CO Measurement Range	0-1000PPM
Warm-up Time	≤3 minutes
CO2 Measurement Range	400-5000PPM
CO2 Measurement Accuracy	±50PPM+5% reading
Output Signal	RS485
Communication Protocol	Standard MODBUS RTU Protocol

Chapter 2: Hardware Connection

2.1 Pre-installation Inspection

Equipment Checklist:

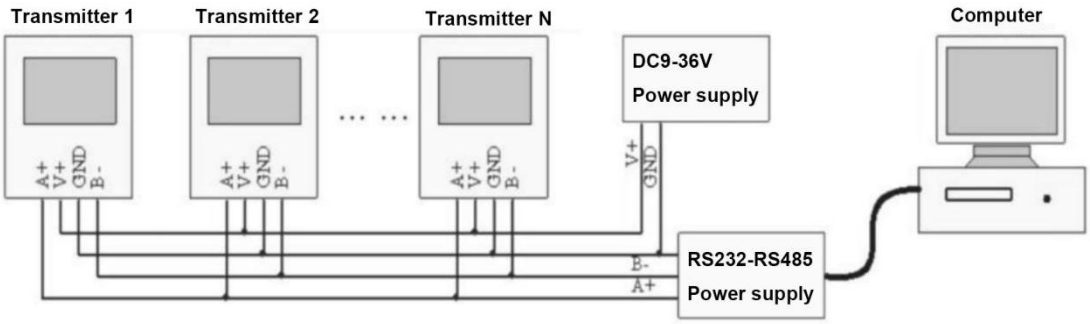
Name	Quantity
S7-1RS485 Multi-Function Transmitter	1
Certificate	1
Expansion Plug	2
Self-tapping Screw	2

2.2 Wiring Instructions and Typical Application of 485

The power interface accepts a wide voltage range of 9-36V. When wiring the 485 signal lines, it is important to ensure that the A and B wires are not reversed, and the addresses of multiple devices on the bus should not conflict with each other.

	Wire Color	Description
Power	Red Power	Positive (+) 9-36 VDC
	Black Power	Negative (-)
Communication	Yellow	485-A
	White	485-B

Note: The default cable length is 0.6m. Pay attention to the wire sequence and ensure that the wires are not reversed. When connecting the device to the 485 bus, make sure that the addresses of multiple devices do not overlap.



485 Typical Application

2.3 Installation Method

The product should be installed in a sheltered environment, mounted vertically at a 90-degree angle to the ground, with the sensor vent facing downwards to prevent water ingress.
Please place the product in a well-ventilated location and avoid installing it in corners, as this can result in slower sensor response and affect reading accuracy.
Start by drilling two 5mm diameter holes in the wall and insert the expansion plugs into the holes. Attach the bottom housing mounting plate using the provided self-tapping screws. Once the bottom housing mounting plate is securely fixed, align the bottom mounting holes of the device with the hooks and slide it downwards to complete the installation.

Chapter 3: Communication Protocol

3.1 Basic Communication Parameters

Encoding	8-bit binary
Data bits	8 bits
Parity bit	None
Stop bit	1 bit
Error checking	CRC (Cyclic Redundancy Check)
Baud rate	Configurable to 1200 bit/s, 2400 bit/s, 4800 bit/s, 9600 bit/s, 19200 bit/s. The default setting is 9600 bit/s.

3.2 Data Frame Format Definition

The communication protocol used is Modbus-RTU, and the format is as follows:
Initial structure: ≥4 bytes of timing
Address code: 1 byte
Function code: 1 byte
Data area: N bytes
Error checking: 16-bit CRC code
End structure: ≥4 bytes of timing

Address code: Represents the address of the transmitter, which is unique in the communication network (default is 0x01).
Function code: Indicates the requested function in the command sent by the host. This transmitter only uses function code 0x03 (read register data).
Data area: Contains the actual communication data. Note that for 16-bit data, the high byte comes first!
CRC code: A two-byte checksum.

Structure of the host inquiry frame:

Address Code	Function Code	Starting Register Address	Register Length	Low Byte of Checksum	High Byte of Checksum
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Response Frame Structure for Slave:

Address Code	Function Code	Number of Valid Bytes	Data Area 1	Data Area 2	Data Area N	Checksum
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

Register Address

Register Address	Data	Operation
0000H	Humidity value (multiplied by 10)	Read-only
0001H	Temperature value (multiplied by 10, actual positive and negative values)	Read-only
0003H	CO concentration value (in PPM)	Read-only
0004H	CO2 concentration value (in PPM)	Read-only
0005H	PM2.5 concentration value (actual value)	Read-only
0007H	PM10 concentration value (actual value)	Read-only
001AH	PM2.5 upper limit alarm value	Read and Write
001BH	PM2.5 alarm switch (0 to disable, 1 to enable)	Read and Write
0020H	Device address (0 to 252, default 1)	Read and Write
0021H	Device baud rate (1200 / 2400 / 4800 / 9600 / 19200, default 9600)	Read and Write

3.4 Communication Protocol Example and Explanation

3.4.1 Read PM2.5 value from device address 0x01

Request Frame:

Address Code	Function Code	Starting Register Address	Data Length	Checksum Low Byte	Checksum High Byte
0x01	0x03	0x00 0x05	0x00 0x01	0x94	0x0B

Response Frame: (For example, reading PM2.5 value as 6 ug/m³)

Address Code	Function Code	Response Frame	PM2.5 Value	Checksum Low Byte	Checksum High Byte
0x01	0x03	0x02	0x00 0x06	0x38	0x46

PM 2.5: 0006H (hexadecimal) = 6 (decimal) → PM 2.5 = 6ug/m³

3.4.2 Read PM10 value of device address 0x01

Query frame:

Address Code	Function Code	Starting Register Address	Data Length	Checksum Low Byte	Checksum High Byte
0x01	0x03	0x00 0x07	0x00 0x01	0x35	0xCB

Response Frame: (For example, reading the PM10 value as 7ug/m³)

Address Code	Function Code	Response Frame	PM2.5 Value	Checksum Low Byte	Checksum High Byte
0x01	0x03	0x02	0x00 0x07	0xF9	0x86

PM 10:

0007H (hexadecimal) = 7 (decimal) → PM 10 = 7ug/m³

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Chapter 6: Quality Assurance

The company provides a 12-month quality guarantee (from the date of shipment) to the direct purchasers of its products. The technical specifications stated in the product's data sheet published by the company shall prevail. If the product is proven to have defects during the warranty period, the company will provide free repair or replacement. The user must meet the following conditions:

① Notify the company in writing within 14 days of discovering the defect.

② The product should be sent back to the company at the purchaser's expense.

③ The product should be within the warranty period.

The company is only responsible for products that have defects arising from their application in accordance with the product's technical specifications. The company does not provide any guarantees, warranties, or written statements regarding the use of its products in specific applications. Furthermore, the company does not make any commitments regarding the reliability of its products in relation to other products or systems.